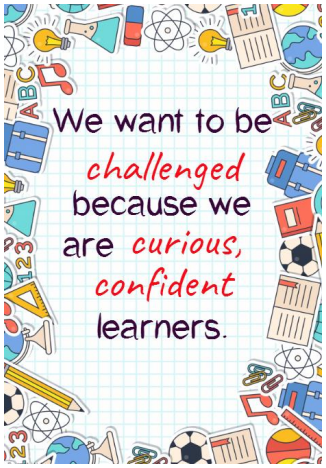
Mathematics

Goodyers End Primary School



Contents

Intent:

1. Our Aims

At Goodyers End, it is recognised and taught that Mathematics helps children to make sense of the world around them through developing their ability to calculate, to reason and to solve problems whilst expressing their reasoning fluently. It enables children to understand and appreciate relationships and patterns in both number and space in their everyday lives.

2. National Curriculum Expectations

The national curriculum for mathematics aims to ensure that **all pupils**:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

3. Our Maths Vision

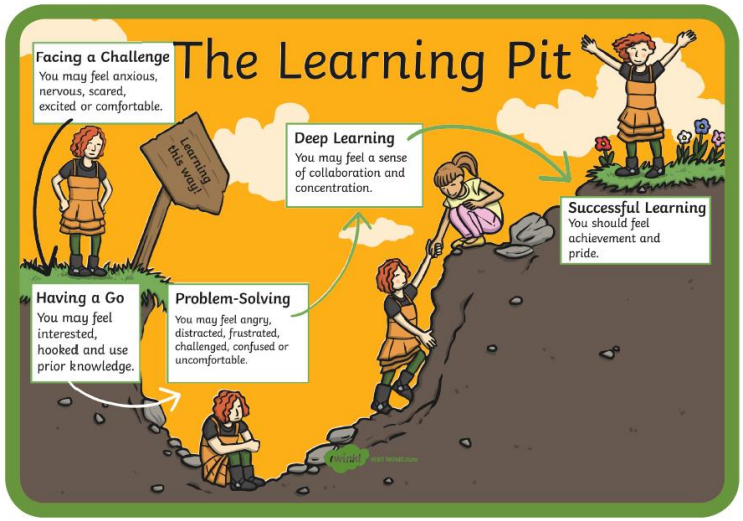
- To develop a positive attitude to maths in which children see it as a subject that can interest and challenge them.
- To develop a "can do" attitude in all of our children.
- To broaden children's knowledge and understanding of how mathematics is used in the wider world.
- To develop mathematical skills and knowledge including quick recall of facts in line with NC recommendations.
- To equip children with the necessary mathematical vocabulary so that they are able to talk about their mathematical understanding with assurance recognising the importance for communication and deep thinking.

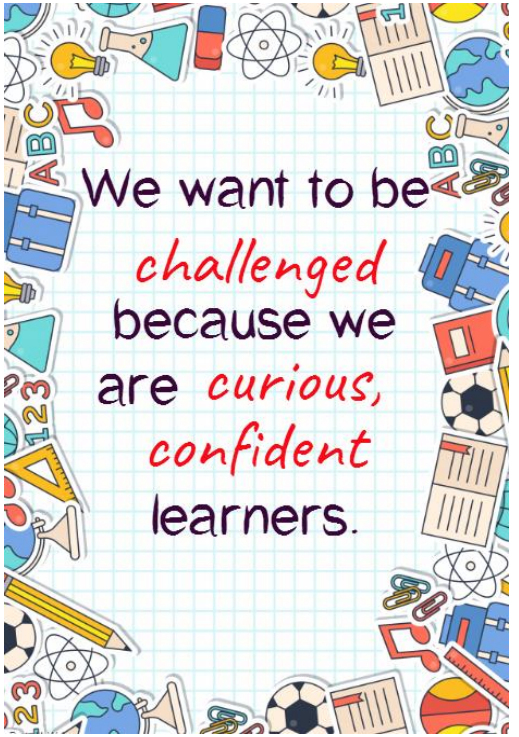
4. Our Ethos:

"We want to be **challenged** because we are **curious**, **confident** learners."

Challenge: We need to be in the 'learning pit' to learn more.
Curious: We want to know how we got to our answer and if there are other ways.
Confident: We always believe that we will achieve.

This Maths ethos underpins our approach to teaching mathematics so that children are exposed to opportunities where they can challenge themselves, are curious about their mathematical process and they are confident about being in the learning 'pit'.





Implementation:

5. Teaching and Learning Style

At Goodyers End, we strive for all teachers to deliver high quality, effective maths lessons based on secure mathematical pedagogy. The school follows the National Curriculum for mathematics. Links, where appropriate, are made to other subjects. The school uses a variety of teaching to cater for the variety of learning styles of pupils in mathematics lessons. Our principle aim is to develop children's knowledge, skills, reasoning, fluency and understanding in mathematics. We use a variety of supporting programs to help plan maths lessons including NCETM Spine Documents, Maths No Problem and White Rose Maths.

We aim to achieve our vision through a daily lesson that includes whole-class and group-direct teaching. During these lessons, we encourage children to ask, as well as answer mathematical reasoning questions. They have the opportunity to use a wide range of resources such as tens frames, number lines, number squares, numicon, base 10 and small apparatus to support their work. Fluency sessions are used daily to reinforce mathematical fluency and arithmetic skills.

The approach that we use is centred on, "making the complex simple". This allows children, with support of adults, to unpick the thinking behind complex mathematical concepts: something that we feel is important for learners at Goodyers End so that they are able to solve problems in the future.

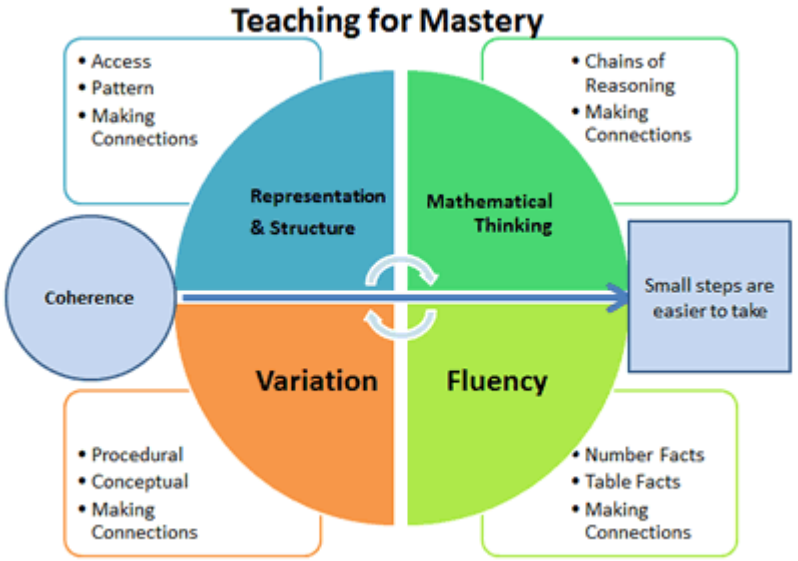
Maths Mastery – 5 Big Ideas

Coherence
Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Representation and Structure
Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation.

Mathematical Thinking
If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others

Fluency
Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.



Variation

Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow-up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

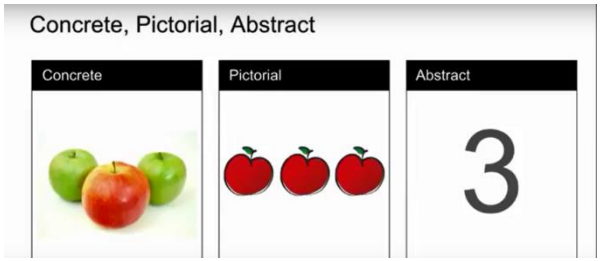
Concrete, Pictorial, Abstract approach

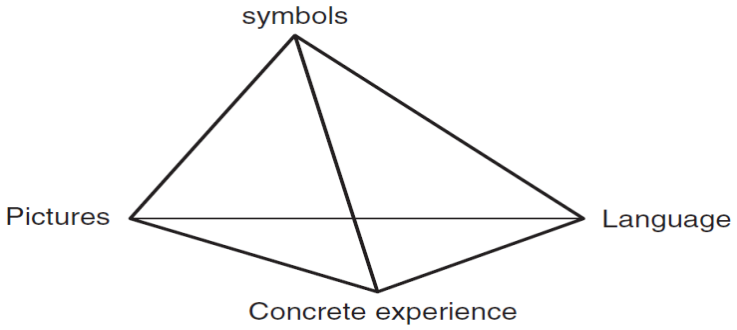
As developed by Bruner, our approach incorporates the CPA approach so that children have a deep-rooted understanding of mathematical concepts.

Concrete – "Doing" stage. This is where children are 'doing' with support of concrete resources in order to model problems, to help children visualise what is happening within the problem and the solution. Children need to have opportunities to handle the physical objects themselves.

Pictorial – "Seeing" stage. Children use visual representations to make the mental connection to the concrete objects so that they are able to visualise the problem in order for it to become more accessible. This is starting to build in a more abstract approach so that children are seeing how the physical objects can then be represented using pictures, shapes, diagrams or models.

Abstract – "Symbolic" stage. Children are now using abstract symbols, the written form of maths to model and solve problems.





Haylock, D. and Thangata, F. (2007) 'Making connections.' *In Key concepts in teaching primary mathematics*. London: SAGE Publications

Haylock's connections model builds on Bruner's work on CPA (concrete, pictorial, abstract). Haylock suggests that these four elements are central to developing understanding in mathematics, and connections between these are essential. Language is the element added by Haylock, and language almost acts as a consistent element across CPA. For example, we might use the same words when we work practically with Numicon or when we work using a number line.

Children are exposed to high quality mathematical vocabulary and stem sentences which allow them to articulate their thinking behind the concept.

Fluency

The first part of each lesson has a fluency focus and is linked to the National Curriculum. This is to drive the fluency facts so that they can be applied throughout their mathematical reasoning and problem solving. EYFS and KS1 use 'Mastering Number' and KS2 build upon this with times tables facts.

The National Curriculum

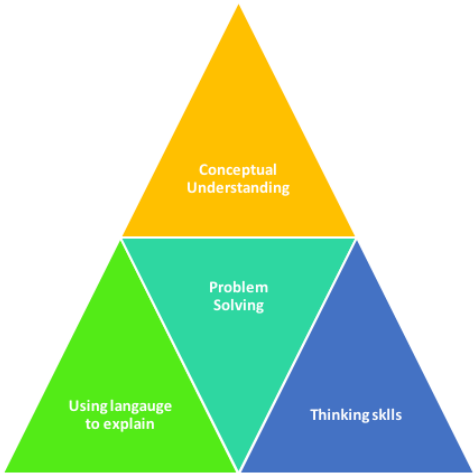
The national curriculum for mathematics aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

(Mathematics programmes of study: key stages 1 and 2 National curriculum in England, Sep 2013)

Fluency Definition: What is Fluency in Maths?

Fluency in maths is about developing number sense and being able to the most appropriate method for the task at hand; to be able to apply a skill to multiple contexts.
The National Curriculum states that pupils should become fluent in the fundamentals of mathematics through varied and frequent practice. While a part of this is about knowing key mathematical facts and recalling them efficiently, fluency means so much more than this as it allows pupils to delve much deeper.



How Does Mathematical Fluency Fit with Reasoning and Problem Solving?

The mastery curriculum for primary schools places problem solving at the heart of mathematics with the main aim that every child can learn to solve sophisticated problems in an unfamiliar context.
To enable them to achieve this, pupils must develop their conceptual understanding, mathematical thinking and use of mathematical language. This is where fluency and reasoning come in.

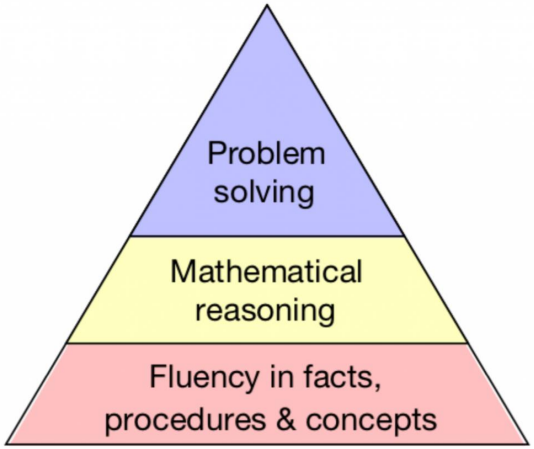
(Third Space Learning, Rebecca Jakes, March 2020)

"The very processes that teachers care about most—critical thinking processes such as reasoning and problem solving—are intimately intertwined with factual knowledge that is stored in long-term memory (not just found in the environment)."

Colin Foster (2019), a reader in Mathematics Education in the Mathematics Education Centre at Loughborough University, says, 'I think of fluency and mathematical reasoning, not as ends in themselves, but as means to support pupils in the most important goal of all: solving problems.'

If you're looking for a one sentence answer to achieving maths mastery through the mastery model of teaching, it's quite simple: **teach everything right the first time.**

Where teachers have to rush through to complete the curriculum, tricks or sometimes lies are often used to cover that content quickly (telling children in KS1 that you cannot take 8 away from 6, for example. The suggested course of action here is to tell the student it is possible, and that this will be covered when we look at another type of subtraction). *(Third Space Learning, Neil Almond, March 2020)*



Through well-planned lessons, the focus is on teaching the maths 'right' the first time to stop common misconceptions.

Fluency targets are given in the National Curriculum. These areas are identified below, children need to be exposed frequently to these targets to ensure that they have the necessary fluency understanding to be subsequently applied across the curriculum. Knowing these facts allows greater space in the working memory so that application of this learning is more effective. These fluency targets are to be looked upon as 'non-negotiable' for children across the school. Children should be achieving these targets so they have the fluency elements they need in order to support their mathematical reasoning and problem solving.

These fluency elements are covered within the curriculum throughout the <u>year</u> and need to be regularly re-visited after being taught.

Number elements:

Phase	Target area
EYFS	**Reception** <u>NCETM EYFS Cardinality and Counting</u> • Children need to know number names, initially to five, then ten, and extending to larger numbers • Children need lots of opportunities to count things in irregular arrangements. • Children need the opportunity to count out or 'give' a number of things from a larger group, not just to count the number that are there. • Subitising: Children need opportunities to see regular arrangements of small quantities, e.g. a dice face, structured manipulatives, etc., and be encouraged to say the quantity represented. Children also need opportunities to recognise small amounts (up to five) when they are not in the 'regular' arrangement, e.g. small handfuls of objects. • Children need to have the opportunity to match a number symbol with a number of things. Look for opportunities to have a range of number symbols available, e.g. wooden numerals, calculators, handwritten.

	• Children need the opportunity to recognise amounts that have been rearranged and to generalise that, if nothing has been added or taken away, then the amount is the same. <u>NCETM EYFS Comparison</u> • Children need progressive experiences where they can compare collections and begin to talk about which group has more things. Initially, the groups need to be very obviously different, with one group having a widely different number of things. • Children need the opportunity to see that groups could consist of equal numbers of things. Children can check that groups are equal, by matching objects on a one-to-one basis. • Children need opportunities to apply their understanding by comparing actual numbers and explaining which is more. • Children can compare numbers that are far apart, near to and next to each other. • Children need opportunities to see and begin to generalise the 'one more than/one less than' relationship between sequential numbers. • Support children in recognising that if they add one, they will get the next number, or if one is taken away, they will have the previous number. <u>NCETM EYFS Composition</u> • Children need opportunities to see small numbers within a larger collection. 'Number talks' allow children to discuss what they see. For instance, with giant ladybirds: 'There are 5 spots altogether. I can see 4 and 1, I can see 3 and 2, and I can see 1 and 1 and 1 and 1 and 1.' • Encourage exploration of all the ways that 'five' can be and look. • Children need opportunities to partition a number of things into two groups, and to recognise that those groups can be recombined to make the same total. Encourage children to say the whole number that the 'parts' make altogether. • Children need opportunities to explore a range of ways to partition a whole number. The emphasis here is on identifying the pairs of numbers that make a total. • Children need opportunities to explore the different ways that numbers can be partitioned, i.e. into more than two groups. • Children need opportunities to say how many are hidden in a known number of things.
KS1	**YEAR 1** <u>NCETM Number and Place Value Progression</u> • Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens • Given a number, identify one more and one less. • Use the language of: equal to, more than, less than (fewer), most, least. • Read and write numbers from 1 to 20 in numerals and words. <u>NCETM Addition and Subtraction Progression</u> • Represent and use number bonds and related subtraction facts within 20 • Add and subtract one digit and two-digit numbers to 20, including zero (including doubles and halves)

	NCETM Multiplication and Division Progression • Count in multiples of twos, fives and tens (copied from Number and Place Value) **YEAR 2** NCETM Number and Place Value Progression • Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward. • Identify, represent and estimate numbers using different representations, including the number line. NCETM Addition and Subtraction Progression • Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 (including doubles and halves) • Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. NCETM Multiplication and Division Progression • Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
LKS2	**YEAR 3** NCETM Number and Place Value Progression • Count from 0 in multiples of 4, 8, 50 and 100 • Find 10 or 100 more or less than a given number • Read and write numbers up to 1000 in numerals and in words • Recognise the place value of each digit in a three digit number (hundreds, tens, ones) • Identify, represent and estimate numbers using different representations NCETM Addition and Subtraction Progression • Add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds (including doubles and halves) • Estimate the answer to a calculation and use inverse operations to check answers NCETM Multiplication and Division Progression

	• Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one digit numbers, using mental and progressing to formal written methods • Estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction) **YEAR 4** <u>NCETM Number and Place Value Progression</u> • Count backwards through zero to include negative numbers • Count in multiples of 6, 7, 9, 25 and 1000 • Find 1000 more or less than a given number • Identify, represent and estimate numbers using different representations • Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) <u>NCETM Addition and Subtraction Progression</u> • Estimate the answer to a calculation and use inverse operations to check answers <u>NCETM Multiplication and Division Progression</u> • Recall multiplication and division facts for multiplication tables up to 12 × 12 • Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • Recognise and use factor pairs and commutativity in mental calculations • Estimate and use inverse operations to check answers to a calculation (copied from Addition and Subtraction)
UKS2	**YEAR 5** <u>NCETM Number and Place Value Progression</u> • Count forwards or backwards in steps of powers of 10 for any given number up to 1000 000 • Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero • Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit <u>NCETM Addition and Subtraction Progression</u> • Add and subtract numbers mentally with increasingly large numbers • Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy <u>NCETM Multiplication and Division Progression</u> • Multiply and divide numbers mentally drawing upon known facts

	• Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • Know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers • Establish whether a number up to 100 is prime and recall prime numbers up to 19 • Recognise and use square numbers and cube numbers, and the notation for squared and cubed **YEAR 6** NCETM Number and Place Value Progression • Use negative numbers in context, and calculate intervals across zero • Read, write, order and compare numbers up to 10 000000 and determine the value of each digit NCETM Addition and Subtraction Progression • Perform mental calculations, including with mixed operations and large numbers • Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. NCETM Multiplication and Division Progression • Perform mental calculations, including with mixed operations and large numbers • Identify common factors, common multiples and prime numbers • Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

Please see separate progression maps for all mathematical areas in the National Curriculum (NCETM Progression documents). It is imperative that skills are re-visited from previous years in order to build upon this learning and make explicit links in the brain.

Fluency Facts:

Year 1	
Autumn 1 – Spring 2	Year 1 Number facts

Summer 1 and 2	Count in multiples of 2, 5 and 10. 2x, 5x, 10x tables facts up to 12 (no division fact)

Year 2

Autumn 1 – Consolidation of Year 1 facts		
Adding 1	0 + 1 1 + 1 1 + 2 1 + 3 1 + 4 1 + 0 1 + 1 2 + 1 3 + 1 4 + 1	1 + 5 1 + 6 1 + 7 1 + 8 1 + 9 5 + 1 6 + 1 7 + 1 8 + 1 9 + 1
Doubles to 5	0 + 0 1 + 1 2 + 2 3 + 3 4 + 4 5 + 5	
Near doubles to 5	1 + 2 2 + 3 3 + 4 4 + 5 2 + 1 3 + 2 4 + 3 5 + 4	
Adding 2	2 + 3 2 + 4 2 + 5 2 + 6 2 + 7 2 + 8 2 + 9 3 + 2 4 + 2 5 + 2 6 + 2 7 + 2 8 + 2 9 + 2	
Number bonds to 10	0 + 10 1 + 9 2 + 8 3 + 7 4 + 6 5 + 5 10 + 0 9 + 1 8 + 2 7 + 3 6 + 4	
Adding 0 to a number	0 + 1 0 + 2 0 + 3 0 + 4 0 + 5 1 + 0 2 + 0 3 + 0 4 + 0 5 + 0	0 + 6 0 + 7 0 + 8 0 + 9 0 + 10 6 + 0 7 + 0 8 + 0 9 + 0 10 + 0 0 + 0
Adding 10 to a number	0 + 10 1 + 10 2 + 10 3 + 10 10 + 0 10 + 1 10 + 2 10 + 3 8 + 10 9 + 10 10 + 10 10 + 8 10 + 9 10 + 10	4 + 10 5 + 10 6 + 10 7 + 10 10 + 4 10 + 5 10 + 6 10 + 7
The ones without a family	5 + 3 6 + 3 3 + 5 3 + 6	

Autumn 2 – Teaching of Year 2 facts		
	Facts	**Consolidation**
Doubles of numbers to 10	6 + 6 7 + 7 8 + 8 9 + 9 10 + 10	Number bonds to 10
Near doubles	5 + 6 6 + 7 7 + 8 8 + 9 9 + 10 6 + 5 7 + 6 8 + 7 9 + 8 10 + 9	Doubles
Bridging	3 + 8 3 + 9 4 + 7 4 + 8 4 + 9 8 + 3 9 + 3 7 + 4 8 + 4 9 + 4	Adding 1 and 2
Bridging	5 + 6 5 + 7 5 + 8 5 + 9 6 + 5 6 + 5 7 + 5 8 + 5 9 + 5 5 + 6	Near doubles
Bridging	6 + 6 6 + 7 6 + 8 6 + 9 7 + 9 6 + 6 7 + 6 8 + 6 9 + 6 9 + 7	Adding 0 to a number
Bridging	7 + 8 8 + 8 8 + 9 9 + 9	Number bonds to 10
		All of Year 2 facts

Multiplication Facts:

Year 2	
Autumn 1 and 2	Year 2 Number Facts
Spring	Recap 2,5 and 10 x tables with the new inclusion of division facts
Summer	3 x tables to 12, including division facts

Year 3

Multiplication Facts:

Year 3

Autumn 1	2, 3, 5 and 10 recap
Autumn 2	4 x tables to 12, making explicit links to 2 x tables and including division facts
Spring 1	8 x tables to 12, making explicit links to 4 x tables and including division facts
Spring 2	6 x tables to 12, making explicit links to 3 x tables and including division facts
Summer 1	11 x tables to 12, including division facts
Summer 2	Revisit all multiplication and division facts (2, 3, 4, 5, 6, 8, 10, 11)

Year 4

Multiplication Facts:

	Year 4
Autumn 1	Recap previously learned tables (2, 3, 4, 5, 6, 8, 10) 9 x tables to 12, making explicit links to 3 x tables and including division facts
Autumn 2	12 x tables to 12, making explicit links to 6 x tables and including division facts
Spring 1	7 x tables to 12, including division facts
Spring 2	Revisit all multiplication and division facts up to 12 x 12
Summer	Revisit all multiplication and division facts up to 12 x 12

Number Sense

Number sense is a deep and flexible understanding of numbers and involves the ability to perceive numbers, how they relate to each other and how they can be manipulated. Number sense underpins most other mathematical learning, so it is vital that children develop a strong understanding of numbers in the early years of their education. Research has shown that characteristics for number sense correlates with later mathematical achievement, so all young children can benefit from acquiring a strong sense of number.

Number sense does not only involve the ability to count, compare and perform operations on numbers, but also requires understanding and flexible manipulation of numbers. Number sense can be improved by encouraging children to make links, reason, giving children opportunities to explore numbers in different ways and move between representations.

(Early Number Sense by Jenny Back, 2014, NRICH)

What teaching strategies promote early number sense?

A number of strategies that help to support developing number sense are described by

Tsao and Lin (2012). They suggest that children need opportunities to:

1. Work with concrete materials and familiar ideas
2. Compose and recompose different arrangements and representations of number
3. Discuss and share their discoveries and solutions
4. Investigate the realistic uses of number in their everyday world
5. Explore number patterns and relationships
6. Create alternative methods of calculation and estimation
7. Solve realistic problems using a variety of approaches
8. Calculate for a purpose rather than just for the sake of calculating
9. Gather, organise, display and interpret quantitative data
10. Measure and estimate measure for a purpose
11. Explore very large numbers and their representations including using number lines

Further information about these areas can be found here.

Subitising

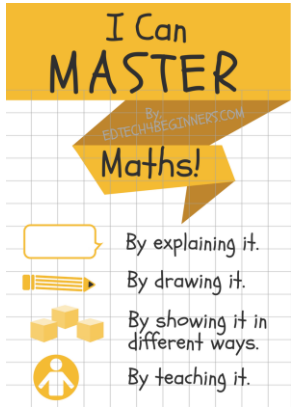
Number fluency is supported by the idea of 'subitising'. Children need to subitise in order to perceive numbers.

Subitising is the ability to instantly identify the number in a set of objects without needing to count them all. It develops alongside counting and can be developed by providing opportunities to explore how numbers combine. The perception of number aids children in appreciating the magnitude and ordr as well as estimation of numbers. Exploring numbers in different representations allows children to appreciate the structure of numbers and how the numbers relate to each other (for example: one more, one less). Subitising and visualising numbers helps develop and retain number facts. An appreciation for numbers as parts which combine to the whole aids in working flexibly with numbers.

The ability to subitise also supports children's number sense and estimation of calculations.

Reasoning and Problem Solving

"Reasoning in maths is the process of applying logical thinking to a situation to derive the correct problem-solving strategy for a given question, and using this method to develop and describe a solution. Put more simply, mathematical reasoning is the bridge between fluency and problem solving."



Mathematical problem solving is at the heart of our approach and is interwoven into our maths curriculum – it is both how children are able to solve problems then reason and understand how they reached their answer.

Problem-Solving Skills

Stage 1: Getting started
Stage 2: Working on the problem
Stage 3: Digging deeper
Stage 4: Concluding

Following this process, children will be exposed to problems which will involve using different skills:

- Trial and improvement
- Working systematically (and remember there will be more than one way of doing this)
- Pattern spotting
- Working backwards
- Reasoning logically
- Visualising
- Conjecturing

6. Mathematical Vocabulary

In order to engage in extended dialogue, pupils need to have a rich diet of mathematical vocabulary to draw upon. High quality discussions can help children to understand complex mathematical problems and reason as to how and why they got their answer. Maths vocabulary needs to taught and used regularly through maths lessons and the wider curriculum. Making connections across the curriculum and to learning in previous years helps children to see the links to other concepts and make connections to prior learning.

"The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions."

National Curriculum in England, Department for Education.

Vocabulary that will support the children's learning should be displayed on the maths working wall with supporting pictures or representations and used throughout every maths lesson.

Question stems

Question stems can encourage dialogue and further reasoning by probing further into the children's thinking.

Are you sure?
How do you know?
What do you notice?
What is the same/different?
Can you convince me?
Is there another way?
Can you imagine...?
Are you saying...?
Is it always, sometimes or never true?
Why?
Tell me more...

Vocabulary expectations for each year group are mapped out on the maths curriculum areas.

7. Planning Maths

When planning, staff will refer to the GYE Maths Curriculum Map, 'NCETM Spine Documents' and STEM sentences to ensure that the teaching points, vocabulary and representations are consistent across the school.
Spine 1: Number, Addition and Subtraction
https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/number-addition-and-subtraction/

Spine 2: Multiplication and Division
https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/multiplication-and-division/
Spine 3: Fractions
https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/fractions/

Written calculations are found on the GYE Maths Curriculum Maps for each mathematical subject.

Resources available:

Targets come from the Maths National Curriculum and learning resources are supplemented by NCETM, Maths No Problem and White Rose Maths. Other resources that are available are: I See Reasoning KS1, LKS2 and UKS2 and I See Problem Solving.

Supporting Documents:

NCETM Spine Documents

NCETM Progression Tool

White Rose Small Steps

Long term overview:

	Autumn	Spring	Summer
Reception	Number -Counting, ordinality and cardinality- wk1, wk6, wk10, wk12 -Subitise 1-6- wk2, wk4, wk11 -Composition of 1,2,3- wk3, wk8 -Compare amounts- wk5, wk7 -Composition of 4 and 5 – wk9 -One more and one less (added into multiple lessons) Measure, Shape and Spatial Thinking - Compare size, mass and capacity - Exploring pattern	Number - Introducing zero - Comparing numbers to 5- wk3 - Composition of 4 and 5- wk1 - 6, 7 and 8- wk2 - Making pairs - Combining two groups - 9 and 10 - Comparing numbers to 10 - Bonds to 10 Measure, Shape and Spatial Thinking - Compare mass	Number - Building numbers beyond 10 - Counting patterns beyond 10 - Adding more - Taking away - Doubling - Sharing and grouping - Even and odd - Deepening understanding patterns and relationships Measure, Shape and Spatial Thinking - Spatial Reasoning

	- Positional language - Squares and rectangles - Circles and triangles - 3D shapes	- Compare capacity - Length and height - Time - 3D shape	- Match, rotate and manipulate-- 3D shapes - Length, weight and capacity - Compose and decompose - Mapping
Year 1	Numbers to and within 10 (4 weeks) Number bonds (1 week) Addition (2 weeks) Subtraction (2 weeks) Numbers to and within 20 (3 weeks)	Addition and subtraction within 20 (4 weeks) Shape (1 week) Length and Height (1 week) Place value to 50 (3 weeks) Word problems (2 weeks) Position (1 week)	Multiplication (1 week) Division (1 week) Fractions (1.5 weeks) Number to 100 (2 weeks) Time (1 week) Money (1 week) Volume and Capacity (1 week) Mass and Space (1 week) Revision
Year 2	Number and Place Value (1 week) Addition and Subtraction (3 weeks) Multiplication and Division (4 weeks) Measure – Units (4 weeks)	Statistics (2 weeks) Measure – money (3 weeks) Geometry: Properties of Shapes, Position and Direction (3 weeks) Fractions (2 weeks) Measure – Time (1 week)	Measure – Volume (1 week) Revision: Addition and Subtraction Multiplication and Division Fractions
Year 3	Number and Place Value (5 weeks) Addition and Subtraction (3 weeks) Multiplication and Division (4 weeks)	Multiplication and Division (2 weeks) Measure: Money (2 weeks) Statistics (2 weeks) Measure: Length and Perimeter (3 weeks) Fractions (3 weeks)	Fractions (3 weeks) Measure: Time (3 weeks) Geometry: Properties of shape (4 weeks) Measure: Mass and Volume (2 weeks)
Year 4	Number and Place Value (4 weeks) Addition and Subtraction (3 weeks) Measure: Length & Perimeter (1 week) Multiplication and Division (3 weeks)	Multiplication and Division (3 weeks) Measure: Area (1 week) Fractions (4 weeks) Decimals (3 weeks)	Decimals including money (1 week) Measure: Time (3 weeks) Geometry: Position and Direction (1 week) Geometry: Properties of shape (2 weeks) Statistics (2 weeks) Multiplication and Division (3 weeks)
Year 5	Number and Place Value (4 weeks) Addition and Subtraction (4 weeks)	Statistics (1 week) Fractions (4 weeks)	Geometry: Properties of shape (3 weeks) Geometry: Position and Direction (2 days)

	Multiplication and Division (4 weeks) 2 weeks to allow for more time to be spent on misconceptions	Decimals (3 weeks) Percentages (2 weeks)	Measure: Conversions (4 weeks) Measure: Area, Perimeter and Volume (3 weeks) Number and Place Value: Roman Numerals (2 days)
Year 6	Number and Place Value (2-3 weeks) Addition, Subtraction, Multiplication and Division (3 weeks) Fractions (6 weeks)	Geometry: Position and Direction (1 week) Decimals and Percentages (2 – 3 weeks) Ratio and Proportion (1 – 2 weeks) Measure: Converting units (2 weeks) Measure: Perimeter, Area and Volume (2 weeks) Algebra (1 week) Geometry: Properties of shape (1 week) Statistics (1 week)	Finish Spring Targets Revision Problem solving investigations

Lesson Structure:

Learning Intention	Pit Activity (In Focus)	Guided Practice (Let's Learn – Textbook Support, Journal)	Independent Practice (Workbook Support)	Plenary – Use Your Head (Link to in focus and set greater depth challenge to inform teacher assessment)
The learning intention is linked to the NC Targets so that children are clear how their learning links to	This is an independent challenge for the children. Based on how difficult they find this will allow the class teacher to make a formative assessment about the children's understanding.	Let's Learn is an opportunity for the teacher to show a method that the children can use. The journal allows them to have a reference to refer back to if they are stuck during independent work. It should be their own notes but can be supported by the teacher. Guided Practice time allows the teacher to expose the children to the	Independent work is given to all of the children to complete that becomes increasingly more challenging as the work continues. Through repetition of the skill, children are able to embed their learning more deeply. Scaffolds are given to support pupils who need it.	The children independently complete the use your head to show the learning that has occurred in the lesson. Have the children learned that mathematical skill? Can they apply it in a different context? Do they know more and remember more?

their next steps.		mathematical knowledge in various contexts.		

8. Home-Learning

Home learning for maths is set using 'My Maths' and is linked to their learning in class.

Impact

9. Assessment and Intervention

Formative assessment happens each lesson through observing children's responses in independent learning and to their use your head. Teachers then make necessary adjustments to the lesson that is planned the following day. Afternoon gap interventions are used to help children 'keep up' rather than 'catch up'. Other interventions are planned to support gaps in learning and help to further challenge the most able learners.

Teachers assess pupils away from the point of teaching using the National Curriculum targets. They also complete summative NFER assessments (Years 1, 3, 4 and 5) and practice SATs papers (Years 2 and 6) that help to show if the children can apply what they have learned. Data is submitted every 12 weeks and teachers send their target overview completed with what the children have achieved, a tracker overview of where the children are and need to be based on KS projections and the NFER/Practice SATs test scores which are analysed by the subject leads.

10. Target Expectation and Teacher Judgement

Target sheet:

Attainment against targets to be filled out on FFT Pupil Tracking for each term. They are to be filled out as the term progresses and used to assess what children have done and where they need to go next in their learning. Some targets will be identified as focus areas for the class or for a small-group intervention.

Overview Tracker:

At the end of each term, staff then complete a tracker which shows the number of children that are on track for greater depth, working at, working towards and below. The vulnerable groups are also identified and their data analysed. Through pupil progress meetings with SLT, target children are identified based on being off-track for termly progress and/or progress against aspirational key stage targets set by FFT.

11. Monitoring

Maths Lead and other members of SLT (Head teacher, Deputy Head teacher, Phase Leaders and SENDCo) complete monitoring to check on the implementation of maths at Goodyers End. Methods used to triangulate judgements are: lesson observations, learning walks, lesson drop-ins, data checks, book looks, pupil voice and staff voice. Monitoring feedback and supporting resources are given to staff then followed-up to ensure action has been taken. As part of the monitoring feedback, leaders give an evaluation that shares the 'bigger picture' of the school so that staff are aware about how their part fits into the whole school target areas.